

# National Public Transportation Safety Plan

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Version 2



U.S. Department of Transportation  
**Federal Transit Administration**

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*The contents of this document do not have the force and effect of law and are not meant to bind the public in any way. This document is intended only to provide clarity to the public regarding existing requirements under the law or agency policies. Recipients and subrecipients should refer to FTA’s statutes and regulations for applicable requirements.*

## Executive Summary

Safety is the number one priority of the United States Department of Transportation (USDOT) and Federal Transit Administration (FTA). The purpose of the National Public Transportation Safety Plan (National Safety Plan) is to guide the national effort to manage safety risk in our nation's public transportation systems. This update continues to mature FTA's national safety program and addresses new requirements in the Bipartisan Infrastructure Law, enacted as the Infrastructure Investment and Jobs Act, to further advance transit safety.

This plan supersedes the plan that FTA published in January 2017. It lays out a performance-based approach to reduce injuries and fatalities on transit systems under FTA's safety jurisdiction. This plan also supports the USDOT's long-term goal of reaching zero fatalities on America's roadways, as presented in the January 2022 [National Roadway Safety Strategy](#), by adding safety performance criteria for vehicular collisions and providing voluntary standards for bus transit.

This plan includes:

- Safety performance criteria for all recipients that must develop Agency Safety Plans under FTA's Public Transportation Agency Safety Plan (PTASP) regulation, 49 CFR part 673, including safety performance measures related to the PTASP safety risk reduction program (see Chapter II); and
- Voluntary minimum safety standards and recommended practices to support mitigation of safety risk and to improve safety performance (see Chapter III), including:
  - Recommendations issued by the National Transportation Safety Board (NTSB),
  - Recommended practices and standards developed by the transit industry, and
  - Recommended precautionary and reactive actions to ensure public and personnel safety and health during an emergency established in consultation with the Secretary of Health and Human Services.

## Introduction

Safety is the top priority of both the USDOT and the FTA. While transit is already one of the safest modes of transportation, FTA is committed to improving safety even further. FTA is committed to developing, implementing, and consistently improving strategies and processes to ensure that public transportation achieves the highest practicable level of safety and is committed to the USDOT's vision of a future with zero transportation-related fatalities and the elimination of transportation-related serious injuries. Transit should be safe for the passengers using the system, the workers operating the system, and the pedestrians, bicyclists, and all other persons who interact with the system.

FTA has adopted the principles and methods of Safety Management Systems (SMS) as the basis for enhancing the safety of public transportation in the United States. FTA follows the principles and methods of SMS in its development and revision of this plan, regulations, policies, guidance, best practices, and technical assistance administered under the authority of 49 U.S.C. § 5329.

SMS is a formal, organization-wide approach to managing safety risk and assuring the effectiveness of a transit agency's safety risk mitigation.<sup>1</sup> SMS includes systematic procedures, practices, and policies for managing hazards and safety risk. FTA will continue to support the transit industry's implementation of SMS and will continue to use SMS to strengthen its own safety management processes.

## Plan Overview

The purpose of the National Safety Plan is to improve the safety of all public transportation systems that receive funding under 49 U.S.C. Chapter 53. FTA uses the National Safety Plan to guide the national effort to manage safety risk in our Nation's public transportation systems. The Bipartisan Infrastructure Law, enacted as the Infrastructure Investment and Jobs Act, adds new elements that must be included in the National Safety Plan, including:

- Safety performance measures related to the PTASP safety risk reduction program;
- In consultation with the Secretary of Health and Human Services, precautionary and reactive actions required to ensure public and personnel safety and health during an emergency; and
- Consideration, where appropriate, of performance-based and risk-based methodologies.

The Bipartisan Infrastructure Law also requires that the minimum safety performance standards for public transportation vehicles used in revenue operations take into consideration, to the extent practicable, innovations in driver assistance technologies and driver protection infrastructure, where appropriate, and a reduction in visibility impairments that contribute to pedestrian fatalities.

The National Safety Plan also acknowledges recommendations made by the NTSB. Chapter III includes, to the extent practicable, voluntary minimum safety standards for public transportation

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<sup>1</sup> 49 CFR § 673.5

vehicles and transit operations that take into consideration relevant NTSB recommendations. In addition to the voluntary standards contained in the National Safety Plan, FTA is exploring expanding its regulatory framework to include potential minimum mandatory baseline standards for public transit safety and NTSB recommendations, including those relating to roadway worker protection and fatigue.

The National Safety Plan is organized into three chapters:

- **Chapter I: Keeping Safety the Top Priority** – This chapter presents FTA’s safety vision, strategic objectives, and an overview of FTA’s National Public Transportation Safety Program; and provides high-level safety performance data related to FTA safety priorities.
- **Chapter II: Safety Performance Criteria** – This chapter defines safety performance measures<sup>2</sup> for transit agencies required to establish and implement Agency Safety Plans under FTA’s PTASP regulation, 49 CFR part 673. The chapter identifies 14 safety performance measures for all modes of public transportation and presents eight safety performance measures for the PTASP safety risk reduction program for agencies that serve an urbanized area with a population of 200,000 or more.
- **Chapter III: Voluntary Minimum Safety Standards and Recommended Practices** – This chapter presents voluntary minimum safety performance standards for public transportation vehicles used in revenue operations and voluntary minimum safety standards to ensure the safe operation of public transportation systems, as well as recommended practices that may support the transit industry in assessing and mitigating safety risk and help improve safety performance.

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<sup>2</sup> In this plan FTA uses the term "performance measure" as a synonym for "performance criteria," which is used in 49 U.S.C. § 5329(b)(2).



## Chapter I: Keeping Safety the Top Priority

### FTA's Safety Vision and Strategic Objectives

FTA is committed to its vision of a better quality of life for all built on public transportation excellence and its mission of improving America's communities through public transportation. Enhancing safety by reducing safety events on the Nation's transit systems is integral to achieving this vision. The [USDOT Strategic Plan](#) establishes Safety as the top strategic goal for the Department, and emphasizes five objectives: Safe Public, Safe Workers, Safe Design, Safe Systems, and Critical Infrastructure Cybersecurity. In addition, FTA has adopted the principles and methods of SMS to achieve the highest degree of safety. The SMS approach is a formal, organization-wide approach for managing safety risk and assuring the effectiveness of safety risk mitigation.

### Areas of Safety Focus

FTA has identified the following five areas of safety focus to guide the implementation of the Federal Public Transportation Safety Program:

- **Transit's role in the community** – Public transportation is on the frontline of many of society's most challenging safety and public health issues, including the Coronavirus Disease 2019 (COVID-19) pandemic, substance abuse, mental health, homelessness, and crime. Transit also advances equity and sustainability in America's communities. Documenting and sharing lessons learned helps the transit community identify and mitigate safety risk to keep passengers and transit workers safe while also advancing opportunity and tackling climate change.
- **Shared responsibility** – Transit safety is a shared responsibility that is coordinated across stakeholders, including government at all levels, labor, industry, nonprofit and advocacy groups, researchers, and the public, to prevent fatalities and serious injuries.
- **Performance-based approach to SMS** – Setting and achieving performance targets and using performance-based standards enhances the SMS approach and supports efforts to identify and mitigate safety risk in transit systems before harmful consequences occur.
- **Data-driven decision-making** – Identifying data relevant to safety, conducting analyses, and developing data-driven conclusions strengthens both the performance of an SMS and the understanding and management of safety risk.
- **Accounting for human factors as part of safety risk mitigation** – Safety risk mitigations developed as part of an SMS should consider and address certain types of human error. This approach recognizes the role of human behavior and works to effectively reduce safety risk for passengers, transit workers, and all who encounter the system.

## The National Public Transportation Safety Program

FTA carries out its safety vision, mission, and strategic objectives through the National Public Transportation Safety Program. In 2012, the Moving Ahead for Progress in the 21st Century Act (MAP-21) amended Federal transit law by authorizing a new public transportation safety program at 49 U.S.C. § 5329. FTA's Safety Program was further strengthened in the Fixing America's Surface Transportation (FAST) Act in 2015 and, most recently, in 2021 through the Bipartisan Infrastructure Law. FTA also carries out an Alcohol and Controlled Substances Testing program under 49 U.S.C. § 5331, which was first established in law in the Omnibus Transportation Employee Testing Act of 1991.

FTA follows the principles and methods of SMS in its development and revision of regulations, policies, guidance, best practices, and technical assistance to administer its Safety Program under the authority of 49 U.S.C. § 5329. The following list identifies the main elements of FTA's Safety Program which include:

- **The National Safety Plan** establishes key safety performance measures and identifies voluntary minimum safety standards and recommended practices to mitigate safety risk and improve safety performance across the transit industry.
- **The Public Transportation Safety Certification Training Program (PTSCTP)**, described in FTA's PTSCTP regulation at [49 CFR part 672](#), establishes a curriculum and provides minimum training requirements to enhance technical proficiency for State Safety Oversight Agency personnel and contractors who conduct safety audits and examinations of rail fixed guideway public transportation systems, and for designated transit agency personnel and contractors who are directly responsible for safety oversight of a recipient's rail fixed guideway public transportation system.
- **The Public Transportation Agency Safety Plan (PTASP) Program**, described in FTA's PTASP regulation at [49 CFR part 673](#), requires certain transit agencies to develop agency safety plans and establish and implement an SMS.
- **The State Safety Oversight (SSO) Program** for rail transit agencies (RTAs), described in FTA's SSO regulation at [49 CFR part 674](#), outlines a State Safety Oversight Agency's authority to oversee rail transit agency safety performance.
- **FTA's safety oversight and enforcement authorities**, described in FTA's Public Transportation Safety Program regulation at [49 CFR part 670](#), establishes substantive and procedural rules for FTA's administration of the Safety Program. Importantly, the rule formally establishes SMS as the foundation for FTA's development and implementation of the Safety Program.

FTA's Safety Program also includes a drug and alcohol compliance program. The Prevention of Alcohol Misuse and Prohibited Drug Use in Transit Operations at 49 CFR part 655, establishes programs to be implemented by employers that receive financial assistance from FTA and by contractors of those employers, that are designed to help prevent accidents, injuries, and fatalities resulting from the misuse of alcohol and use of prohibited drugs by those performing safety-sensitive functions.

In addition, FTA's Safety Program considers how the condition of transit assets can affect safety performance. In passing MAP-21, Congress recognized the critical relationship between safety and asset condition, requiring the National Safety Plan to include the definition of state of good repair set in the rulemaking for asset management (49 U.S.C. § 5329(b)(2)(B)). The Transit Asset Management (TAM) rule at 49 CFR part 625 defines state of good repair as "the condition in which a capital asset is able to operate at a full level of performance" (49 CFR § 625.5). Both TAM and PTASP emphasize opportunities for transit agencies to share information and analyses, thereby improving decision-making agency-wide to address safety risk.

Finally, FTA's internal Safety Risk Management (SRM) process supports FTA's Safety Program by proactively identifying and addressing safety concerns in the transit industry. FTA uses its SRM process to assess and mitigate industry-wide safety risk using authorities specified in 49 U.S.C. § 5329. FTA also used outputs from this process to support the identification of public transportation safety priorities outlined in this National Safety Plan.

## Public Transportation Safety Data

While public transportation fatalities and injuries comprise less than one percent of total casualties on America's surface transportation network,<sup>3</sup> transit fatalities and injuries remain a significant concern for America's communities. Over the last six years, there has been a general increasing trend in the number and rate of major transit safety events and fatalities reported to FTA's National Transit Database (NTD).

Between 2016 and 2021, the U.S. public transportation industry reported an annual average of 9,498 major safety events,<sup>4</sup> 284 fatalities, and 21,066 injuries requiring immediate medical attention away from the scene to the NTD.<sup>5</sup> The tables below present the annual industry-wide counts and rates (per 100 million Vehicle Revenue Miles (VRM)) for these metrics between calendar years 2016 and 2021 as reported by transit agencies to the NTD.

Counts	2016	2017	2018	2019	2020	2021	Annual Average
Major Events	9,988	9,801	10,121	10,522	7,739	8,819	9,498
Fatalities	269	254	263	278	304	334	284
Injuries	23,970	23,144	23,157	23,695	15,742	16,687	21,066

<sup>3</sup> [USDOT National Roadway Safety Strategy](#), page 1.

<sup>4</sup> Major events are defined in the [NTD Safety and Security Policy Manual](#).

<sup>5</sup> These numbers include data reported to the NTD by full and reduced reporters and excludes rail service under the jurisdiction of the Federal Railroad Administration. See the [NTD Reporting Manuals](#) for descriptions of reporting thresholds and other information.



Rates per 100M VRM	2016	2017	2018	2019	2020	2021	2016–2021
Major Event Rate	227.90	221.90	227.81	234.69	214.54	238.76	227.72
Fatality Rate	6.14	5.75	5.92	6.20	8.43	9.04	6.80
Injury Rate	546.93	523.98	521.24	528.52	436.41	451.77	505.05

From 2016 to 2021, the U.S. public transportation industry averaged 284 fatalities per year. The fatality rate (per 100 million VRM) has increased in each of the last four years, with the transit industry reporting its highest number of fatalities in 2021, despite reduced service and ridership during the COVID-19 pandemic affecting years 2020 and 2021.

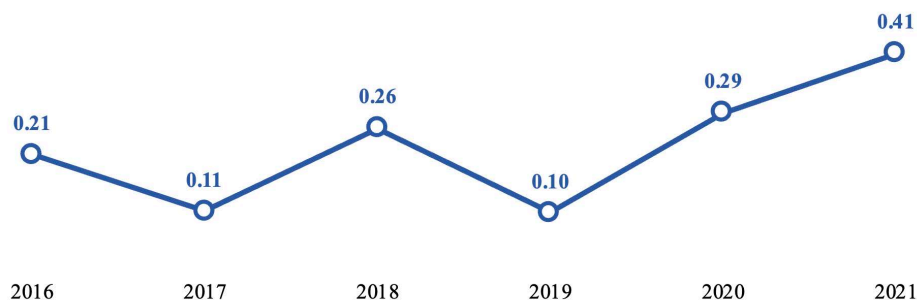
Major event numbers and rates (per 100 million VRM) remained relatively constant but dropped in 2020. Major event counts remained low in 2021, but rates increased above pre-pandemic levels in 2021. Injury numbers and rates (per 100 million VRM) also did not vary considerably between 2016 and 2019 but dropped significantly in 2020. Injury numbers and rates increased in 2021 but were still below 2016–2019 levels.

## Public Transportation Safety Concerns

FTA has identified the following significant safety concerns in the transit industry:

- 1) **Transit Worker Fatalities** – Despite safety risk mitigations put in place to protect transit workers from harm, the transit industry continues to experience workforce fatalities. The chart below shows the transit worker fatality rates (per 100 million VRM) between 2016 and 2021, as reported to the NTD.<sup>6</sup>

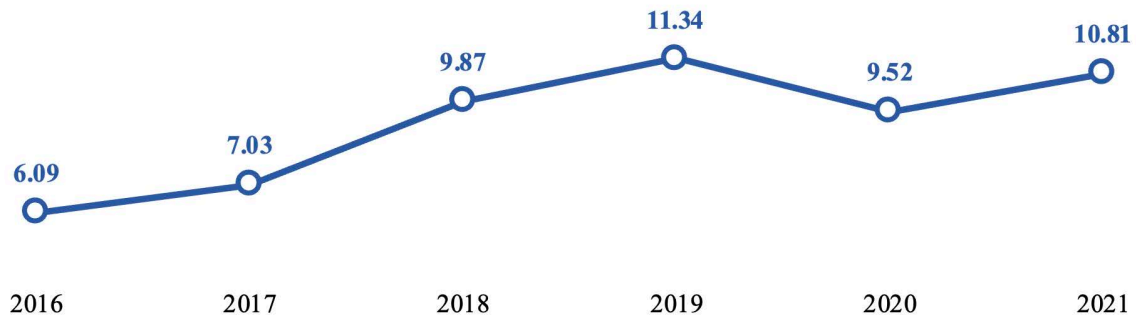
**Figure 1: Transit Worker Fatality Rate (per 100M VRM)**



<sup>6</sup> See [NTD Reporting Manuals](#) for reporting requirements.

- 2) **Assaults on Transit Workers** – FTA’s internal SRM process has identified assaults on transit workers as a key safety concern for the transit industry. The chart below, which uses data reported to the NTD, depicts a significant increase in the rate of assaults where a transit worker was injured or killed (per 100 million VRM) between 2016 and 2021 across bus and rail transit modes.<sup>7</sup>

**Figure 2: Transit Worker Assault Event Rate (per 100M VRM)**



- 3) **Bus Transit Collisions** – The Bipartisan Infrastructure Law requires Section 5307 recipients that serve an urbanized area with a population of 200,000 or more to include in their Agency Safety Plans a safety risk reduction program that, in part, addresses the reduction of vehicular and pedestrian accidents involving buses. The chart below shows bus transit pedestrian and vehicular collision fatality rates (per 100 million VRM) between 2016 and 2021, as reported to the NTD.

**Figure 3: Bus Vehicular and Pedestrian Collision Fatality Rates (per 100M VRM)**



<sup>7</sup> See [NTD Reporting Manuals](#) for reporting requirements.

## Chapter II: Safety Performance Criteria

This chapter establishes safety performance measures<sup>8</sup> for all modes of public transportation. Per 49 CFR § 673.11(a)(3), a recipient's Agency Safety Plan must include performance targets based on the safety performance measures established under the National Safety Plan. In addition, the Bipartisan Infrastructure Law requires the Safety Committee of recipients of Urbanized Area Formula funds under 49 U.S.C. § 5307 (Section 5307) that serve an urbanized area with a population of 200,000 or more (large UZA) to set performance targets for their safety risk reduction programs.

The continuous improvement requirements for transit agencies established under the Safety Assurance component of SMS at 49 CFR § 673.27(d) require transit agencies to establish a process to assess safety performance.

### **Safety Performance Measures for All Agencies Subject to the PTASP Regulation**

Safety performance measures help support transit agency safety risk management and safety assurance processes. The Safety Assurance component of an SMS leverages a structured approach of planning, identifying safety performance measures, conducting data analysis, setting safety performance targets, and monitoring safety performance. Safety performance measures provide the basis for continuous safety improvement.

To align safety performance measurement requirements across all agencies subject to the PTASP regulation, the measures outlined in this chapter are based on safety and service data that the NTD collects from applicable agencies. For clarification on NTD reporting requirements and definitions, please refer to the latest NTD Safety & Security Reporting Policy Manual at the [NTD Manuals web page](#).

All transit agencies subject to the PTASP regulation report safety data to the NTD. However, due to NTD reporting requirements, some smaller transit agencies may report less-detailed safety and security event data than larger agencies. Some of the measures defined below use categories that exceed the level of detail these smaller agencies report to the NTD. Where data is not reported to the NTD, agencies should reference internal agency records to identify appropriate data for each measure to support the setting of all required targets.

The previous version of the National Safety Plan identified safety performance measures to support the required PTASP safety performance target setting for all modes of public transportation, identifying seven (7) measures for each mode (or modal group). This updated plan identifies 14 safety performance measures for all transit providers subject to the PTASP regulation. The table below lists each safety performance measure and indicates which performance measures are additions from the previous version of the National Safety Plan.

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<sup>8</sup> In this plan FTA uses the term "performance measure" as a synonym for "performance criteria" which is used in statute at 49 U.S.C. § 5329(b)(2).

Safety Performance Measure		Description
1	Measure 1a – Major Events	This includes all safety and security major events as defined by the NTD.
2	Measure 1b – Major Event Rate	This includes all safety and security major events as defined by the NTD, divided by VRM.
3	<b><i>Measure 1.1 – Collision Rate (new)</i></b>	This includes all collisions reported to the NTD, divided by VRM.
4	<b><i>Measure 1.1.1 – Pedestrian Collision Rate (new)</i></b>	This includes all collisions “with a person,” as defined by the NTD, divided by VRM.
5	<b><i>Measure 1.1.2 – Vehicular Collision Rate (new)</i></b>	This includes all collisions “with a motor vehicle,” as defined by the NTD, divided by VRM.
6	Measure 2a – Fatalities	This includes all fatalities as defined by the NTD.
7	Measure 2b – Fatality Rate	This includes all fatalities as defined by the NTD, divided by VRM.
8	<b><i>Measure 2.1 – Transit Worker Fatality Rate (new)</i></b>	This includes all transit worker fatalities as defined by the NTD, including the categories “Transit Employee/Contractor,” “Transit Vehicle Operator,” and “Other Transit Staff,” divided by VRM.
9	Measure 3a – Injuries	This includes all injuries as defined by the NTD.
10	Measure 3b – Injury Rate	This includes all injuries as defined by the NTD, divided by VRM.
11	<b><i>Measure 3.1 – Transit Worker Injury Rate (new)</i></b>	This includes all transit worker injuries as defined by the NTD, including the categories “Transit Employee/Contractor,” “Transit Vehicle Operator,” and “Other Transit Staff,” divided by VRM.
12	<b><i>Measure 4a – Assaults on Transit Workers (new)</i></b>	This includes all assaults on transit workers as defined by the NTD. <sup>9</sup>
13	<b><i>Measure 4b – Rate of Assaults on Transit Workers (new)</i></b>	This includes all assaults on transit workers as defined by the NTD, <sup>9</sup> divided by VRM.
14	Measure 5 – System Reliability	This includes Major Mechanical System failures as defined by the NTD.

<sup>9</sup> Historically, assaults on transit workers were not collected in the NTD as a separate category from other assaults and were not reported if they did not result in a fatality, injury, or other major event threshold. Additionally, the term *transit worker* previously only included paid employees and contractors and excluded volunteers. On February 23, 2023, FTA finalized new NTD reporting requirements that will collect data on all assaults on all transit workers, regardless of injury. Some of these reporting requirements took effect in Calendar Year 2023, while others will take effect in NTD Report Year 2023.

## **Safety Performance Targets for All Agencies Subject to the PTASP Regulation**

The PTASP regulation requires all applicable transit agencies to set safety performance targets based on the safety performance measures established in the National Safety Plan. In this context, the measure defines the data point that an agency will “watch” to monitor safety performance. The target defines the desired level of safety performance over a specified timeframe (e.g., annually). Rates are calculated using VRM, as defined by and reported to the NTD.

In general, a transit agency sets annual safety performance targets that represent its safety performance goals for the coming year. Transit agencies may define their own methodology for setting targets. For example, in its efforts to improve safety an agency may want to improve its own current safety performance or set performance targets based on peer agency benchmarking. Please note that transit agencies that serve a large UZA are subject to additional target setting requirements as part of the safety risk reduction program, as defined in 49 U.S.C. § 5329.

## **Safety Performance Measures for Safety Risk Reduction Programs**

The Bipartisan Infrastructure Law requires Section 5307 recipients that serve an urbanized area with a population of 200,000 or more to include in their Agency Safety Plan a safety risk reduction program for transit operations. These safety risk reduction programs aim to improve safety performance by reducing the number and rates of accidents, injuries, and assaults on transit workers, including:

- a reduction of vehicular and pedestrian accidents involving buses that includes measures to reduce visibility impairments for bus operators that contribute to accidents, including retrofits to buses in revenue service and specifications for future procurements that reduce visibility impairments; and
- the mitigation of assaults on transit workers, including the deployment of assault mitigation infrastructure and technology on buses, including barriers to restrict the unwanted entry of individuals and objects into the workstations of bus operators when a risk analysis performed by the transit agency’s Safety Committee determines that such barriers or other measures would reduce assaults on transit workers and injuries to transit workers.

The Bipartisan Infrastructure Law directs that performance measures for a safety risk reduction program, required under 49 U.S.C. 5329(d)(4), be included in the National Safety Plan (49 U.S.C. 5329(b)(2)(A)). FTA identifies the below eight measures for the safety risk reduction program. The Safety Committee of applicable transit agencies will use these measures to set targets for the safety risk reduction program, as required by 49 U.S.C. 5329(d) and 49 CFR § 673.19(d)(2). Under the new Bipartisan Infrastructure Law requirements, the Safety Committee must establish these targets using a 3-year rolling average of the data the agency submits to the NTD.

Required Safety Risk Reduction Program Measure		Description
1	Major Events	This includes all safety and security major events as defined by the NTD.
2	Major Event Rate	This includes all safety and security major events as defined by the NTD, divided by VRM.
3	Collisions	This includes all collisions reported to the NTD.
4	Collision Rate	This includes all collisions reported to the NTD, divided by VRM.
5	Injuries	This includes all injuries as defined by the NTD.
6	Injury Rate	This includes all injuries as defined by the NTD, divided by VRM.
7	Assaults on Transit Workers	This includes all assaults on transit workers as defined by the NTD. <sup>10</sup>
8	Rate of Assaults on Transit Workers	This includes all assaults on transit workers as defined by the NTD, <sup>10</sup> divided by VRM.

Some of the performance measures for the safety risk reduction program overlap with the measures for all agencies subject to the PTASP regulation described above. Section 5307 recipients that serve an urbanized area with a population of 200,000 or more may choose to use the target set by the Safety Committee for the safety risk reduction program for both measures, provided the target for the safety risk reduction program is set using a 3-year rolling average of NTD data.

The Bipartisan Infrastructure Law establishes a safety set aside requirement for all Section 5307 recipients that serve a large UZA. These transit agencies must allocate not less than 0.75 percent of section 5307 funds to eligible safety-related projects. As required under the Bipartisan Infrastructure Law and at 49 CFR § 673.27(d)(3)(iii), if an agency fails to meet a safety performance target under the safety risk reduction program, it must allocate its safety set aside in the following fiscal year to eligible projects that are reasonably likely to assist the agency in meeting the target.

<sup>10</sup> Historically, assaults on transit workers were not collected in the NTD as a separate category from other assaults and were not reported if they did not result in a fatality or serious injury, or other major event threshold. Additionally, the term *transit worker* previously only included paid employees and contractors and excluded volunteers. On February 23, 2023, FTA finalized new NTD reporting requirements that will collect data on all assaults on all transit workers, regardless of injury. Some of these reporting requirements took effect in Calendar Year 2023, while others will take effect in NTD Report Year 2023.



## Modal Groups: Rail, Fixed Route Bus, and Non-Fixed Route Bus

Transit agencies must set targets for the different modes of transit service they provide. When setting targets based on the safety performance measures for all agencies subject to the PTASP regulation and for the safety risk reduction program, transit agencies should use the following modal groups: rail, fixed route bus, and non-fixed route bus. Using this approach, a transit agency would only set the required targets for three modal groups, regardless of how many individual modes of transit service it reports to the NTD. The following table presents these three modal groups and the individual NTD modes included in each.

Rail	Fixed Route Bus	Non-Fixed Route Bus
<ul style="list-style-type: none"> <li>• Heavy Rail (HR)</li> <li>• Light Rail (LR)</li> <li>• Streetcar (SR)</li> <li>• Hybrid Rail (YR)</li> <li>• Monorail/Automated Guideway (MG)</li> <li>• Inclined Plane (IP)</li> <li>• Cable Car (CC)</li> <li>• Aerial Tramway (TR)</li> </ul>	<ul style="list-style-type: none"> <li>• Motorbus (MB)</li> <li>• Commuter Bus (CB)</li> <li>• Bus Rapid Transit (RB)</li> <li>• Trolley Bus (TB)</li> <li>• Publico (PB)</li> <li>• Jitney (JT)</li> </ul>	<ul style="list-style-type: none"> <li>• Demand Response (DR)</li> <li>• Vanpool (VP)</li> </ul>

**Note:** The modes above exclude Alaska rail (AR), commuter rail (CR), and ferry boat (FB). The PTASP regulation does not apply to certain modes of transit service that are subject to the safety jurisdiction of another Federal agency, including passenger ferry operations that are regulated by the United States Coast Guard and commuter rail operations that are regulated by the Federal Railroad Administration.

## **Chapter III: Voluntary Minimum Safety Standards and Recommended Practices**

FTA has identified voluntary minimum safety standards and recommended practices for improving public transportation safety. These include safety performance standards for public transportation vehicles used in revenue operations and safety standards to ensure the safe operation of public transportation systems. These standards also further a comprehensive approach to roadway safety within the United States. These voluntary safety standards and recommended practices are provided as resources to support the transit industry in assessing and mitigating safety risk.

To the extent practicable, the voluntary minimum safety performance standards for public transportation vehicles take into consideration relevant recommendations of the NTSB, recommendations and best practices standards developed by the public transportation industry, innovations in driver assistance technologies and driver protection infrastructure, and strategies to reduce visibility impairments that may contribute to pedestrian fatalities.

Similarly, to the extent practicable, the voluntary minimum safety standards to ensure the safe operation of public transportation systems take into consideration relevant recommendations of the NTSB, best practices standards developed by the public transportation industry, minimum safety standards or performance criteria being implemented across the public transportation industry, and recommendations from FTA's Review and Evaluation of Public Transportation Safety Standards report prepared pursuant to Section 3020 of the Fixing America's Surface Transportation (FAST) Act.

FTA strongly encourages transit agencies to review these voluntary minimum safety standards and recommended practices and incorporate them into their operations and maintenance, as appropriate. These standards and practices may help transit agencies improve safety performance in response to the safety performance measures outlined in Chapter II and may support the development of mitigations and strategies to address specific safety concerns identified by the transit agency or its Safety Committee. Further, FTA strongly encourages transit agencies to work with roadway owner(s) to proactively address safety concerns to benefit the riding public, particularly those that reach public transportation through walking, biking, and those that make use of assistive devices including wheelchairs.

The voluntary safety standards and recommended practices included in this chapter include standards developed through research supported by FTA; other Federal agencies, such as the Federal Highway Administration (FHWA) and Federal Railroad Administration (FRA); the American Public Transportation Association (APTA), the designated standards development organization for the public transportation industry; and associations focused on electrical and mechanical engineering practices and technical and safety training, among others. This chapter of the National Safety Plan also includes voluntary safety standards and recommended practices identified by the NTSB to address findings resulting from investigations of major public transportation accidents.

Where safety standards and/or recommended practices have not yet been developed, this chapter identifies useful resources for transit agencies to consider from FTA, the Transit Cooperative Research Program (TCRP) of the Transportation Research Board, FTA's Transit Advisory Committee for Safety (TRACS), and other sources, where applicable.

The National Safety Plan includes 11 categories of voluntary safety standards and recommended practices:

- **Category A: Transit Worker Safety (Bus and Rail Transit)** – to reduce transit worker fatalities and injuries
  - Subcategory A.1: Transit Worker Assault Prevention (Bus and Rail Transit)
  - Subcategory A.2: Roadway Worker Protection (Rail Transit)
  - Subcategory A.3: Fatigue Management, Fitness for Duty, and Employee Distraction (Bus and Rail Transit)
- **Category B: Pedestrian and Bicyclist Safety (Bus and Rail Transit)** – to reduce collisions with pedestrians and bicyclists resulting in fatalities and injuries
- **Category C: Rail Grade Crossing Safety (Rail Transit)** – to reduce rail transit collisions at rail grade crossings resulting in fatalities and injuries
- **Category D: Bus Transit Safety (Bus Transit)** – to reduce bus transit collisions resulting in fatalities and injuries
- **Category E: Tunnel Ventilation and Fire Safety (Rail Transit)** – to reduce the consequences of fire and smoke events in tunnels
- **Category F: Signal System Safety (Rail Transit)** – to improve the performance and reliability of signal systems to control train movement and reduce collisions
- **Category G: Vehicle Safety (Bus and Rail Transit)** – to improve the design and performance of transit vehicles to protect occupants, communicate safety information, and support emergency access and egress
  - Subcategory G.1: Vehicle Crashworthiness and Brake Testing (Bus and Rail Transit)
  - Subcategory G.2: Vehicle End-of-Railcar Door Messaging (Rail Transit)
  - Subcategory G.3: Vehicle Emergency Systems and Fire Safety (Rail Transit)
  - Subcategory G.4: Vehicle Safety Standards and Practices (Bus Transit)
- **Category H: Electronic Recording Devices and Cameras (Rail Transit)** – to support monitoring of transit operations and investigation of safety events
- **Category I: Operations Procedures, Compliance, and Training (Bus and Rail Transit)** – to support compliance with and sufficiency of operations procedures and the training, supervision, and qualification of operations personnel

- **Category J: Maintenance Procedures, Compliance, and Training (Bus and Rail Transit)** – to support compliance with and sufficiency of maintenance procedures and the training, supervision, and qualification of maintenance personnel
- **Category K: Precautionary and Reactive Actions during an Emergency** – to ensure public and worker health and safety during emergencies

## **Category A: Transit Worker Safety (Bus and Rail Transit)**

*(To reduce transit worker fatalities and injuries)*

### **Subcategory A.1: Transit Worker Assault Prevention (Bus and Rail Transit)**

[Vol. 1 – Research Overview](#) and [Vol. 2 – User Guide](#), TCRP

TCRP Report 193 – Tools and Strategies for Eliminating Assaults Against Transit Operators

*Considerations for preventing assaults against transit operators and a set of checklists, voluntary guidelines, and methodologies.*

[Report 14-01](#), TRACS

Preventing and Mitigating Transit Worker Assaults in the Bus and Rail Transit Industry

*Recommendations for reducing assaults.*

### **Subcategory A.2: Roadway Worker Protection (Rail Transit)<sup>11</sup>**

[Report 0212](#), FTA

FTA Standards Development Program: Rail Transit Roadway Worker Protection

*Research on existing standards and best practices, use cases, a risk assessment matrix, and high-level concepts of operations for roadway worker protection.*

[APTA RT-OP-S-016-11](#), APTA

Roadway Worker Protection Program Requirements

*Recommendations for formalized safe operating practices as they pertain to work performed on or in proximity to rail transit rights-of-way.*

[APTA RT-OP-RP-026-20](#), APTA

Roadway Worker Near Miss Reporting Requirements

*Recommendations on the elements that comprise comprehensive near-miss reporting so useful information is gathered and analyzed.*

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<sup>11</sup> Recommended practices and safety standards in this subcategory also address safety concerns identified by the NTSB in R-13-039, R-13-040, R-14-036, R-14-038, R-14-039 and R-14-040.

[APTA RT-OP-S-004-03](#), APTA

Work Zone Safety Practices

*Recommendations on ways to address situations that are present when workers perform routine and emergency work on an operating rail line.*

[APTA RT-OP-S-010-04](#), APTA

Contractors' Responsibility for Safety on the Right-of-Way

*Recommendations for formalizing contractors' responsibilities for knowing, complying with, and enforcing rail transit system guidelines, rules, and procedures to govern the activities of contractors performing work on or near a rail right-of-way.*

**Subcategory A.3: Fatigue Management, Fitness for Duty, and Employee Distraction (Bus and Rail Transit)<sup>12</sup>**

***Fatigue Management***

[APTA RT-OP-S-015-09](#), APTA

Standard for Train Operator Hours-of-Service Requirements

*Outline of the basic elements of an hours-of-service program that creates the conditions in which train operators have an opportunity to get sufficient rest between work shifts to minimize the impact of fatigue on their job performance.*

[APTA RT-OP-S-023-17](#), APTA

Fatigue Management Program Requirements

*Recommendations on developing a fatigue management program to mitigate the impacts of fatigue.*

[Report 14-02](#), TRACS

Establishing a Fatigue Management Program for the Bus and Rail Transit Industry

*Recommendations regarding the components of a successful fatigue management program, including hours of service, shift scheduling, fatigue prevention and awareness training, fitness-for-duty medical evaluations and screenings, work and vehicle environment design, safety culture, incident investigation, and data collection.*

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<sup>12</sup> Recommended practices and safety standards in this sub-category also address safety concerns identified by the NTSB in R-15-018, R-15-019, R-15-20 and R-15-021.



### ***Fitness for Duty***

[APTA RT-OP-S-018-12](#), APTA

#### **Fitness for Duty Program Requirements**

*Recommendations on developing a fitness for duty program so rail transit systems may formalize measures to hire rail vehicle and on-track equipment operators who are able to perform physical job duties.*

[APTA RT-OP-S-014-04](#), APTA

#### **Standard for Train Operating Employees Reporting to Work**

*Recommendations on conducting readiness reviews of train operators before they begin vehicle operations to allow an extra margin of safety concerning employee fitness and readiness to operate a rail vehicle.*

[R-09-011](#), NTSB

*Recommendation made to all rail transit agencies to establish a program to identify operators who are at high risk for obstructive sleep apnea or other sleep disorders and require that such operators be appropriately evaluated and treated.*

### ***Distraction***

[APTA RT-OP-S-017 -11](#), APTA

#### **Electronic Device Distraction Policy Requirements**

*Recommendations on developing a policy that provides direction as to when and where electronic devices may and may not be used by rail transit system employees.*

[APTA BTS-BS-RP-005-09](#), APTA

#### **Reducing Driver-Controlled Distractions While Operating a Vehicle on Agency Time**

*Recommended practices for reducing operator distractions.*

## **Category B: Pedestrian and Bicyclist Safety (Bus and Rail Transit)**

*(To reduce collisions with pedestrians and bicyclists resulting in fatalities and injuries)*

### ***Design***

[Improving Safety for Pedestrians and Bicyclists Accessing Transit](#), FHWA/FTA

*Recommendations for improving pedestrian safety.*

[Pedestrian and Bicycle Safety](#), USDOT

*Links to Federal policies, manuals, and other materials on pedestrian and bicycle safety.*

[Pedestrian and Bicycle Safety](#), FHWA

*Links to projects, programs, and materials for use in reducing pedestrian and bicyclist fatalities.*

[Complete Streets](#), FHWA

*Links to funding and design, plans and analysis, and construction, operation, and maintenance practices in integrating safety in roadway design for all roadway users.*

[Engineering Design for Pedestrian Safety at Highway-Rail Grade Crossings](#), FRA

*Research report on engineering designs for pedestrian treatments at rail grade crossings.*

[Transit Street Design Guide](#), National Association of City Transportation Officials (NACTO)

*Guidance for the development of transit facilities on city streets and the design and engineering of city streets to prioritize transit, improve transit service quality, and support other transit-related goals.*

[Urban Street Design Guide](#), NACTO

*The toolbox and tactics cities use to make streets safer, more livable, and more economically vibrant.*

[Urban Bikeway Design Guide](#), NACTO

*State-of-the-practice solutions for creating complete streets that are safe and enjoyable for bicyclists.*

[Global Street Design Guide](#), NACTO

*Guidance on how to measure the success of urban streets to include access, safety and mobility for all users, environmental quality, economic benefit, public health, and overall quality of life.*

[APTA SUDS-UD-RP-009-18](#), APTA

Bicycle and Transit Integration: A Practical Transit Agency Guide to Bicycle Integration and Equitable Mobility

*Recommendations for transit agencies and municipalities seeking to facilitate active first/last mile connections to transit, reduce congestion, and promote healthy communities, including context-driven strategies for integrating bicycles with transit.*

***Treatments***

[Report 0111](#), FTA

Manual on Pedestrian and Bicycle Connections to Transit

*Best practices for improving pedestrian and bicycle safety and access to transit.*

[TCRP Report 175](#), TCRP

Guidebook on Pedestrian Crossings of Public Transit Rail Services

*Engineering treatments designed to help improve pedestrian safety for light rail and streetcar.*

[Proven Safety Countermeasures](#), FHWA

*Recommended countermeasures and strategies to reduce roadway fatalities and serious injuries.*

[Safe Transportation for Every Pedestrian](#), FHWA

*Resources for recommended countermeasures to protect pedestrians.*

[Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations](#), FHWA

*Recommendations for countermeasures at uncontrolled pedestrian crossing locations.*

***Suicide and Trespassing***

[Report 0227](#), FTA

Mitigations for Trespasser and Suicide Fatalities and Injuries

*Mitigation strategies and countermeasures that may be used by rail transit agencies to reduce trespasser and suicide fatalities and injuries.*

## Category C: Rail Grade Crossing Safety (Rail Transit)

*(To reduce rail transit collisions at rail grade crossings resulting in fatalities and injuries)*

### **Assessment**

#### [Report 0216](#), FTA

FTA Standards Development Program: Rail Transit Roadway/Pedestrian Grade Crossing (Exploratory Report)

*Literature review, industry survey, development of general use cases for grade crossing, and case studies on four transit properties.*

#### [Safety Bulletin 19-03](#), FTA

Safety Considerations Associated with Rail Transit Grade Crossings

*Voluntary considerations for rail transit grade crossing.*

#### [APTA RT-RGC-RP-003-03](#), APTA

Rail Transit Grade Crossing Safety Assessment

*An organized, structured approach for assessing the safety of new and existing rail transit system highway rail grade crossings.*

### **Design and Treatments**

#### [Highway-Rail Crossing Handbook](#), FRA/FHWA

*Current practices and requirements for engineering treatments for rail grade crossings.*

#### [APTA RT-RGC-S-004-03](#), APTA

Rail Transit Grade Crossing Warning System Design Criteria Installation and Operation

*Recommendations for selecting, installing, and operating highway rail transit grade crossing warning systems, warning devices, highway traffic signs, and other highway traffic-control appliances.*

### **Public Education**

#### [APTA RT-RGC-RP-002-02](#), APTA

Rail Transit Grade Crossing Public Education

*Recommended practices for developing public education for rail transit grade crossings.*

#### [Operation Lifesaver](#)

*Voluntary materials for improving grade crossing safety.*

## Category D: Bus Transit Safety (Bus Transit)

*(To reduce bus transit collisions resulting in fatalities and injuries)*

[Synthesis 126](#), TCRP

Successful Practices and Training Initiatives to Reduce Accidents and Incidents at Transit Agencies

*Analysis of practices and training initiatives to reduce accidents and incidents.*

[Synthesis 145](#), TCRP

Current Practices in the Use of Onboard Technologies to Avoid Transit Bus Incidents and Accidents

*Analysis of the use of on-board technology to avoid accidents and incidents.*

## Category E: Tunnel Ventilation and Fire Safety (Rail Transit)

*(To reduce the consequences of fire and smoke events in tunnels<sup>13</sup>)*

[Safety Advisory 15-1](#), FTA

Audit All Rail Fixed Guideway Public Transportation Systems (RFGPTS) with Subway Tunnel Environments

*Requirement for SSOAs to conduct an audit of all RFGPTS with subway tunnel environments (not currently active).*

[Report 0231](#), FTA

Specifications and Guidelines for Rail Tunnel Design, Construction, Maintenance, and Rehabilitation

*Identifies existing specifications and guidelines for rail transit tunnel design, construction, maintenance, and rehabilitation.*

[Report 0235](#), FTA

Specifications and Guidelines for Rail Tunnel Repair and Rehabilitation

*Research on specifications and guidelines for rail transit tunnel repair and rehabilitation.*

[Report 0236](#), FTA

Specifications and Guidelines for Rail Tunnel Inspection and Maintenance

*Research on specifications and guidelines for rail transit tunnel maintenance and inspection.*

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<sup>13</sup> Recommended practices and safety standards in this category also address safety concerns identified by the NTSB in R-16-001 and R-16-002.

[NFPA 130](#), National Fire Protection Association (NFPA)  
Standard for Fixed Guideway Transit and Passenger Systems  
*Fire protection requirements for transit systems.*

## Category F: Signal System Safety (Rail Transit)

*(To improve the performance and reliability of signal systems to control train movement and reduce collisions<sup>14</sup>)*

### **General**

[Safety Advisory 22-2](#), FTA  
Signal System Safety and Train Control

*Recommends that State Safety Oversight Agencies (SSOAs) direct rail transit agencies in their jurisdictions to consider signal system safety and train control as part of their Safety Risk Management processes. Recommends that SSOAs incorporate SA 22-2 into their oversight activities.*

[APTA RT-SC-009-03](#), APTA  
Standard for Audio Frequency Track Circuit Inspection and Maintenance

*Recommendations for assuring the safety and reliability of audio frequency track circuit systems.*

### **Communications Based Train Control**

[Report 0225](#), FTA  
Needs Assessment for Transit Rail Transmission-Based Train Control (TBTC)

*Identifies standards, systems and products that have the potential to provide risk reduction benefits.*

[IEEE 1474.1](#), Institute of Electrical and Electronics Engineers (IEEE)  
Standard for Communications-Based Train Control Performance and Functional Requirements

*Guidance for enhancing performance, availability, operations, and train protection using a communications-based train control system.*

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<sup>14</sup> Recommended practices and safety standards in this category also address safety concerns identified by the NTSB in R-15-022.



[IEEE 1474.2](#), IEEE

Standard for User Interface Requirements in Communications-Based Train Control Systems

*Guidance on communications-based train control systems user interface and how to present this information to the user.*

[IEEE 1474.3](#), IEEE

Recommended Practice for Communications-Based Train Control System Design and Functional Allocations

*A preferred system design and functional allocation for communications-based train control systems.*

[IEEE 1474.4](#), IEEE

Recommended Practice for Functional Testing of a Communications-Based Train Control System

*A preferred approach for functional testing of a communications-based train control system based on the system design and functional allocations defined in IEEE Std 1474.3.*

***Locking Tests***

[APTA RT-SC-S-004-02](#), APTA

Standard for Approach Locking Testing

*Recommendations on how to verify that rail transit approach locking systems are operating safely and as designed.*

[APTA RT-SC-S-005-02](#), APTA

Standard for Route Locking Tests

*Recommendations on how to verify that rail transit route locking systems are operating safely and as designed.*

[APTA RT-SC-S-006-02](#), APTA

Standard for Time Locking Tests

*Recommendations on how to verify that rail transit time locking systems are operating safely and as designed.*

[APTA RT-SC-S-010-02](#), APTA

Standard for Traffic Locking Tests

*Recommendations on how to verify that rail transit traffic locking will prevent traffic from changing direction on a section of track in between interlockings while that section is occupied or while a signal displays an aspect to proceed into that section.*

### ***Signal System Components***

#### [APTA RT-SC-S-011-03](#), APTA

Standard for Cable Plant Inspection and Testing

*Recommendations on how to verify that rail transit cable plants are operating safely and as designed.*

#### [APTA RT-SC-S-027-03](#), APTA

Standard for Switch Inspection and Obstruction Testing

*Recommendations on how to verify that rail transit switch machines and associated indication circuitry are operating safely and as designed.*

#### [APTA RT-SC-S-028-03](#), APTA

Standard for Vital Relay Testing

*Recommendations on how to verify that rail transit vital relays are operating safely and as designed.*

#### [APTA RT-SC-RP-033-03](#), APTA

Recommended Practice for Visual Inspection of Wayside Signal Equipment

*Recommendations to aid in identifying visual defects or other potentially hazardous conditions related to wayside signal equipment.*

#### [APTA RT-SC-S-035-03](#), APTA

Standard for Vital Processor-Based System Inspection, Testing and Configuration Control

*Recommendations on how to verify that vital processor-based systems are operating safely and as designed.*

#### [APTA RT-SC-RP-008-03](#), APTA

Recommended Practice for Train-to-Wayside Communication System Inspection and Testing

*Guidance on how to verify that train-to-wayside communication systems and equipment are operating safely and as designed.*

#### [APTA RT-SC-RP-001-02](#), APTA

Recommended Practice for Wayside Signal AC Power System Inspection and Testing

*Recommendations on how to verify that wayside signal AC power systems and equipment are operating safely and as designed.*

[APTA RT-SC-RP-002-02](#), APTA

Recommended Practice for Wayside Signal DC Power System Inspection and Testing

*Recommendations on how to verify that wayside DC signal power systems and equipment are operating safely and as designed.*

[APTA RT-SC-S-036-03](#), APTA

Standard for Wayside Signal Inspection and Testing

*Recommendations on how to verify that wayside signal systems are operating safely and as designed.*

[APTA RT-SC-S-040-03](#), APTA

Standard for AC Track Circuit Inspection and Maintenance

*Recommendations on how to verify that AC track circuits and equipment are operating safely and as designed.*

[APTA RT-SC-S-043-03](#), APTA

Standard for Impedance Bond Inspection and Maintenance

*Recommendations on how to verify that rail transit audio frequency and power impedance bonds are operating safely and as designed.*

***Public Education***

[APTA RT-RGC-RP-002-02](#), APTA

Recommended Practice for Rail Transit Grade Crossing Public Education

*Recommendations for developing rail transit grade crossing public safety and trespass prevention education programs.*

## Category G: Vehicle Safety (Bus and Rail Transit)

*(To improve the design and performance of transit vehicles to protect occupants, to communicate safety information, and to support emergency access and egress<sup>15</sup>)*

### **Subcategory G.1: Vehicle Crashworthiness and Brake Testing (Bus and Rail Transit)**

#### ***Vehicle Crashworthiness***

##### **[Report 0141](#)**, FTA

FTA Standards Development Program: Crashworthiness/Crash Energy Management Follow-up for Less than 30 Ft Bus

*Results of a study on the needs and gaps for voluntary standards or recommended practices for crashworthiness and crash energy management for less than 30-ft. paratransit body-on-chassis buses (cutaways).*

##### **[Report 0179](#)**, FTA

FTA Standards Development Program: Crashworthiness/Crash Energy Management for Transit Bus

*Results of an examination of the existing standards, guidelines, and recommendations associated with crashworthiness and crash energy management for transit buses, including articulated buses, bus rapid transit buses, and paratransit body-on-chassis buses.*

##### **[Report 0233](#)**, FTA

FTA Standards Development Program: Crash Energy Management for Heavy Rail Vehicles, Light Rail Vehicles, and Streetcars

*Report includes a summary of transportation modes that lack crashworthiness and crash energy management standards, existing standards implemented into industries related to crashworthiness, and crash energy management used for newly-procured equipment and industry survey results of the use of the standards implemented.*

##### **[ASME RT-2](#)**, American Society of Mechanical Engineers (ASME)

Safety Standard for Structural Requirements for Heavy Rail Transit Vehicles

*Guidance on incorporating passive safety design concepts related to heavy rail transit carbody performance during collisions.*

##### **[ASME RT-1](#)**, ASME

Safety Standard for Structural Requirements for Light Rail Vehicles and Streetcars

*Guidance on incorporating passive safety design concepts related to light-rail vehicle carbody performance during collisions.*

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<sup>15</sup> Recommended practices and safety standards in this sub-category also address safety concerns identified by the NTSB in R-06-006 and R-17-004.

[APTA RT-VIM-RP-025-15](#), APTA

Recommended Practice for Operator Protection Features for Rail Transit Vehicles

*Recommendations on vehicle features to consider improving operator protection when procuring new rail transit vehicles.*

***Vehicle Brake Performance and Inspection***

[Safety Advisory 14-2](#), FTA

Verification of Rail Vehicle Safe Stopping Distances in Terminal Stations

*Requirement for rail transit agencies to review terminal station configurations to verify that designed braking distances address the actual operating conditions in stations, including authorized train speeds, train length and length of platform, the position of signals and trip stops, and the bumping post installation.*

[APTA RT-VIM-S-007-02](#), APTA

Standard for Friction Brake Equipment Periodic Inspection and Maintenance

*Recommendations on the basic procedures to apply when performing periodic inspections and maintenance of brake cylinders, tread brake units, disc brake units, brake discs, tread brake shoes, and disc brake pads for rail transit vehicles.*

**Subcategory G.2: Vehicle End-of-Railcar Door Messaging (Rail Transit)**<sup>16</sup>

[Safety Bulletin 20-01](#), FTA

End-of-Railcar Door Signage and Messaging

*Safety considerations associated with end-of-railcar door signage and messaging in rail transit vehicles.*

[APTA PR-PS-S-002-98, Rev. 3](#), APTA

Standard for Emergency Signage for Egress/Access of Passenger Rail Equipment

*Recommendations on designing and selecting the physical characteristics, informational content, and placement of all interior emergency exit and exterior rescue access signs/markings and instructions.*

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<sup>16</sup> Recommended practices and safety standards in this sub-category also address safety concerns identified by the NTSB in R-19-039 and R-19-040.

[APTA RT-VIM-S-021-10](#), APTA

Standard for Emergency Signage for Rail Transit Vehicles

*Recommendations on minimum design and performance criteria for rail transit car emergency signage that functions under normal conditions and also operates when normal and/or emergency lighting systems are unavailable.*

[ISO 3864-1:2011](#), International Standards Organization (ISO) Graphical Symbols — Safety Colours and Safety Signs

Part 1: Design Principles for Safety Signs and Safety Markings

*Guidance on safety identification colors and design principles for workplace and public area safety signs and safety markings for the purpose of accident prevention, fire protection, health and hazard information, and emergency evacuation.*

[ISO 7010:2019](#), ISO

Graphical symbols — Safety Colours and Safety Signs — Registered Safety Signs

*Guidance on safety signs for the purposes of accident prevention, fire protection, health hazard information, and emergency evacuation.*

**Subcategory G.3: Vehicle Emergency Systems and Fire Safety (Rail Transit)**

***Emergency Systems***

[Report 0199](#), FTA

Emergency Lighting and Signage for Rail Transit Passenger Vehicles (Report 0199)

*Results of research on existing reports, standards, and regulations related to emergency lighting and signage and their use on all rail modes.*

[APTA RT-VIM-S-026-12](#), APTA

Standard for Rail Transit Vehicle Passenger Emergency Systems

*Information on various passenger emergency systems for rail transit agencies to consider when purchasing new vehicles.*

[APTA RT-VIM-S-020-10](#), APTA

Standard for Emergency Lighting System Design for Rail Transit Vehicles

*Recommendations on emergency lighting system designs that provide lighting when power loss disrupts normal lighting.*



[APTA RT-VIM-S-022-10](#), APTA

Standard for Low-Location Exit Path Marking

*Recommendations on the design and use of passive-type markings due to the lower cost and maintenance requirements compared with active marking system designs.*

**Fire Safety**

[NFPA 130](#), NFPA

Standard for Fixed Guideway Transit and Passenger Systems

*Guidance on essential items for fire protection and life safety for underground, surface, and elevated fixed guideway transit and passenger rail systems.*

[Safety Advisory 15-1](#), FTA

Audit All Rail Fixed Guideway Public Transportation Systems (RFGPTS) with Subway Tunnel Environments

*Identifies specific areas of concern identified by the National Transportation Safety Board that State Safety Oversight Agencies will audit.*

**Subcategory G.4: Vehicle Safety Standards and Practices (Bus Transit)**

***Remanufacturing or Rebuilding Brake and Chassis Components***

[APTA BTS-BC-RP-009-20](#), APTA

Recommended Practice for Remanufacturing or Rebuilding of Transit Bus Brake and Chassis Components

*A high-level overview of key considerations when preparing specifications to remanufacture or rebuild bus brake and chassis components.*

**Fire Safety**

[APTA BTS-BS-RP-001-05](#), APTA

Recommended Practice for Transit Bus Fire Safety Shutdown

*Recommendations on the notifications and systems and circuits to shut off after a fire is detected.*

[APTA BTS-BS-RP-002-07](#), APTA

Recommended Practice for Transit Bus Electrical System Requirements Related to Fire Safety

*Recommendations for transit bus electrical control system configuration for electrical circuits related to fire safety.*

[APTA BTS-BS-RP-003-08](#), APTA

Recommended Practice for Installation of Transit Vehicle Fire Protection Systems

*Recommended minimum performance specifications for detection of and suppression of thermal events on transit vehicles.*

## **Category H: Electronic Recording Devices and Cameras (Rail Transit)**

*(To support monitoring of transit operations and investigation of safety events<sup>17</sup>)*

### ***Event Data Recorders***

[IEEE 1482.1-2013](#), IEEE

Standard for Rail Transit Vehicle Event Recorders

*Guidelines for on-board devices/systems with crashworthy memory that record data to support accident/incident analysis.*

### ***Inward- and Outward-Facing Cameras***

[Safety Bulletin 20-02](#), FTA

Inward- and Outward-Facing Image and Audio Recorders

*Information for State Safety Oversight Agencies and rail transit agencies on installing inward- and outward-facing image and audio recorders in the controlling cabs and cab car operating compartments to support safety risk management and safety assurance activities.*

[Report 0200](#), FTA

Inward- and Outward-facing Audio and Video Recordings for Transit Rail Vehicles

*Report documents the research necessary to assist APTA in developing a recommended practice for the industry to install inward- and outward-facing cameras and audio recorders, consistent with the National Transportation Safety Board's recommendation to FTA, R-17-13.*

[APTA RT-OP-RP-024-19](#), APTA

Recommended Practice for Crash and Fire Protected Inward-and-Outward-Facing Audio and Image Recorders in Rail Transit Operating Compartments

*Recommendations on the specifications for and the installation and maintenance of audio and image recording devices in rail transit vehicle operating compartments.*

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<sup>17</sup> Recommended practices and safety standards in this category also address safety concerns identified by the NTSB in R-15-023 and R-17-013.

## **Category I: Operations Procedures, Compliance, and Training (Bus and Rail Transit)**

*(To support compliance with and sufficiency of operations procedures and the training, supervision, and qualification of operations personnel)*

### ***Operations Control Center***

[APTA RT-OP-S-005-03](#), APTA

Standards for Operations Control Centers

*Addresses the primary elements of the general design/function and overall authority essential in an OCC facility and the functional elements of OCC personnel and their applicable roles.*

[APTA RT-OP-S-006-03](#), APTA

Standard for Rail Transit Signals Operating Rules and Procedures

*Recommendations on applying and using train control signal technology to enhance safe, efficient train operation through the application of operating rules and procedures.*

[APTA RT-OP-RP-030-21](#), APTA

Recommended Practice for Defensive Rail Operations

*Recommendations on creating programs that encourage and promote operating trains and other rail transit vehicles in a defensive manner.*

### ***Competencies and Training***

[APTA RT-OP-S-013-03](#), APTA

Standard for Training of Rail Operating Employees

*An outline of the basic elements of a comprehensive rail operating employee training and retraining program.*

[APTA RT-OP-RP-029-21](#), APTA

Recommended Practice for Rail Operations Employee Development Practices

*A framework for the types of employee development practices that rail transit agencies may enact to assist their employees in gaining the requisite skills to advance within rail operations and supervision.*

***Compliance with and Sufficiency of Operations Rules and Procedures***

[APTA RT-OP-S-011-10](#), APTA

Standard for Rule-Compliance Program Requirements

*Recommendations on developing a formal program that promotes comprehension of rail transit system rules and how to measure and enforce employee adherence to the established rules.*

[APTA RT-OP-S-001-02](#), APTA

Standard for Rulebook Development and Review

*Recommendations on developing and revising a transit operating system rulebook, and suggestions for rulebook issuance and authority.*

[APTA RT-OP-S-019-14](#), APTA

Standard for Rail Transit Operations Supervisor Program Requirements

*Baseline recommendations for rail operations supervisor job duties to improve supervisor effectiveness, and guidance on monitoring and managing supervisor performance.*

[TCRP Report 149](#), TRB

Improving Safety-Related Rules Compliance in the Public Transportation Industry

*Potential best practices for all of the elements of a comprehensive approach to safety-related rules compliance.*

**Category J: Maintenance Procedures, Compliance, and Training (Bus and Rail Transit)**

*(To support compliance with and sufficiency of maintenance procedures and the training, supervision, and qualification of maintenance personnel)*

***Fixed Structures***

[APTA RT-FS-S-001-02](#), APTA

Standard for Rail Transit Fixed Structures Inspection and Maintenance

*Recommendations on the minimum means, methods, and frequency of period safety inspections and maintenance activities of rail transit structure safety-critical components and the qualifications that employees or contractors must have to perform these procedures.*

### ***Track***

[Report 0215](#), FTA

Research Report and Findings: Review of Standards for Track Inspection and Maintenance

*Research on the state of inspection and maintenance practices for rail transit agencies in the U.S.*

[APTA RT-FS-S-002-02](#), APTA

Standard for Rail Transit Track Inspection and Maintenance

*Recommendations for rail transit track inspection and maintenance.*

### ***Stations, Shops, and Yards***

[APTA RT-FS-S-003-02](#), APTA

Recommended Practice for Rail Transit Station, Shop and Yard Inspection and Maintenance

*Recommendations for rail transit station, shop, and yard inspection and maintenance.*

### ***Traction Power Electrification Systems***

[APTA RT-FS-S-004-03](#), APTA

Standard for Traction Electrification Substation Inspection, Maintenance, and Testing

*Recommendations for testing traction electrification activities.*

[APTA RT-FS-S-005-03](#), APTA

Standard for Traction Electrification Stray Current/Corrosion Control Equipment Inspection and Maintenance

*Recommendations for the control of stray current and corrosion control.*

[APTA RT-FS-S-006-03](#), APTA

Standard for Traction Electrification Distribution System Inspection, Maintenance, and Testing

*Recommendations for inspection, maintenance, and testing of traction electrification distribution systems.*

### ***Rail Grade Crossings***

[APTA RT-RGC-S-001-02](#), APTA

Standard for Rail Transit Grade Crossing Warning Device Inspection, Testing, and Maintenance

*Recommendations for inspection, maintenance, and testing of grade crossing warning devices.*

### ***Rail Maintenance Training***

[APTA RT-RMT-RP-001-10](#), APTA

Recommended Practice for Rail Vehicles Maintenance Training Standards

*Recommendations for rail vehicle maintenance training.*

[APTA RT-VIM-RP-011-03](#), APTA

Recommended Practice for Rail Transit Vehicle Inspection and Maintenance Training and Qualifications

*Recommended practices for rail vehicle inspection and maintenance training and qualifications.*

[APTA RT-RMT-RP-002-10](#), APTA

Recommended Practice for Rail Signals Maintenance Training Content and Standards

*Recommendations for rail signal maintenance training.*

[APTA RT-SC-RP-031-03](#), APTA

Recommended Practice for Signal Maintenance Personnel Hiring Qualifications, Training, and Competencies

*Recommendations for signal maintenance personnel qualification and training.*

[APTA RT-RMT-RP-003-10](#), APTA

Recommended Practice for Elevator and Escalator Maintenance Training Guidelines Standards

*Recommendations for training for elevator and escalator maintenance.*

[APTA RT-RMT-RP-004-10](#), APTA

Recommended Practice for Traction Power Maintenance Training Standards

*Recommendations for traction power maintenance training.*

### ***Electric Buses***

[Report 0252](#), FTA

Safety and Security Certification of Electric Bus Fleets – Industry Best Practices

*Minimum safety and security certification program practices and protocols for transit agencies to verify that battery electric buses and their associated facilities, systems, and equipment are safe for revenue operations.*

[Report 0253](#), FTA

Procuring and Maintaining Battery Electric Buses and Charging Systems – Best Practices

*Best practices for procuring and maintaining battery electric buses and charging systems.*

## **Category K: Precautionary and Reactive Actions during an Emergency**

*(To ensure public and worker health and safety during emergencies)*

### ***Coordination with U.S. Department of Health and Human Services (HHS)***

[Administration for Strategic Preparedness and Response](#), HHS

*HHS emergency preparedness and response main page.*

[Ventilation in Buildings](#), CDC

*Ventilation mitigation strategies for buildings.*

### ***Emergency Response and Recovery***

[COVID-19 Resource Tool for Public Transportation](#), FTA

*Federal COVID-19 guidance and recommendations.*

[Using Your Safety Management System \(SMS\) to Mitigate Infectious Disease and Respiratory Hazard Exposure](#), FTA

*Sources of hazard identification data and potential mitigations to inform the Safety Risk Management process.*

[Response and Recovery from Declared Emergencies and Disasters](#), FTA

*Transit response and recovery actions and funding in response to declared emergencies and disasters, including major accidents, terrorist actions, and natural disasters.*

[APTA SS-SEM-S-014-20](#), APTA

Standard for Transit Agency Emergency Management Program

*Recommendations for transit emergency response programs.*

[APTA RT-OP-S-007-04](#), APTA

Standard for Rail Transit Agency System Emergency Management Requirements

*Recommendations for rail transit emergency management.*

[APTA SS-SEM-S-005-09](#), APTA

Standard for Developing a Transit Agency Response Plan to a Public Health Emergency

*Recommendations for creation and implementation of a basic response plan to a public health emergency.*



[APTA SS-SEM-WP-016-20](#), APTA

Recommended Practice for Developing a Pandemic Virus Service Restoration Checklist

*Recommendations for service restoration after pandemic event.*

[APTA SS-SEM-RP-002-08](#), APTA

Recommended Practice for First Responder Familiarization of Transit Systems

*Recommended practices for ensuring first responder system familiarization.*

[APTA SS-SEM-S-004-09](#), APTA

Standard for Transit Exercises

*Recommendations for transit drills and exercises.*

[APTA SS-SEM-RP-009-09](#), APTA

Recommended Practice for Emergency Communication Strategies for Transit Agencies

*Recommendations for effective communications during emergencies.*

[APTA SS-SEM-RP-011-09](#), APTA

Recommended Practice for Regional Emergency Planning and Participation in Mutual Aid

*Recommendations for regional emergency planning and mutual aid.*

[APTA SS-SEM-RP-015-19](#), APTA

Recommended Practice for Suspension of Service of a Public Transportation System and Recovery

*Strategies for managing service suspension and recovery.*